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EXAMINER

LEPISTO, RYAN A

ART UNIT

PAPER NUMBER

2883

DATE MAILED: 10/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/763,326

Applicant(s)

IZHAKY ET AL

Examiner

Ryan Lepisto

Art Unit

2883

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 and 9-27 is/are pending in the application.
- 4a) Of the above claim(s) 14-22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-11, 13 and 23-27 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: On page 9 line 1, the tapers should be numerals 20 and 22 not 24 and 26.

Appropriate correction is required.

Claim Objections

2. **Claim 1** is objected to because of the following informalities:
 - With regard to claim 1: It is improper to compare limitations to "prior art switches" in the claim unless it is a Markush claim. Since this claim does not state prior art structure and the improvement to it as needed in a Markush claim, the statement and text containing the phrase "prior art switches" is improper and should be removed. The rest of the claimed properties are acceptable claim language.
3. There is no claim 8.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 4, 5, 9, 26 and 27** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject

Art Unit: 2883

matter which applicant regards as the invention and therefore are not treated on their merits.

- With regard to claims 4 and 26: These claims state an “infinite number of varying radii” which is structurally and practically impossible. First, applicant admits on page 8 lines 8-9 that due to fabrication limitations the number of varying radii must be finite. Second, mathematically the radii can approach infinite, but in real practice there must be a finite number of radii no matter how large the number of radii gets and therefore, claiming infinite varying radii is unclear and indefinite.
- With regard to claims 5 and 27: These claims state that waveguide sections are “approximated and replaced” by radii values. It is unclear if applicant means that waveguide sections are produced physically in silicon and then somehow replaced by a second “approximated” waveguide bends with different radii value or if the radii values are approximated before fabrication and fabricated to the approximation.
- With regard to claim 9: This claim states the coupler may include an “optional” mediating waveguide. The term “optional” makes it unclear if this limitation is indeed critical to the invention if it is only optional and therefore makes the claim indefinite for not limiting the parent claim if this limitation can be included or not without change in the invention since it is optional.

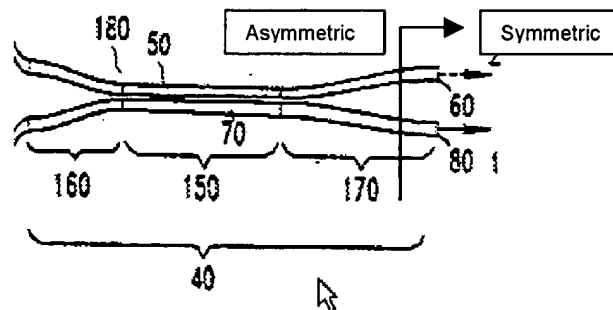
Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 1-3, 6-7, 10, 13 and 23-25** are rejected under 35 U.S.C. 102(b) as being anticipated by **Cohen et al (US 5,418,686)** (Cohen). Note, claims 4, 5, 9, 26 and 27 are indefinite and therefore are not treated on their merits. Cohen teaches a 2x2 optical switch (Fig. 2) formed by glass on a silicon substrate (column 3 lines 4-5) comprising a first 3dB adiabatic coupler (140) having a first pair of constant width, asymmetric (different widths) waveguide branches (60, 80) having a variable curvature and separated by a changing space (between 60 and 80) that blends into a symmetric intersection area and symmetric branches (part of 170) (see figure showing the approximate boundary between the symmetric and asymmetric portions of the couplers),



a second 3dB adiabatic coupler (130) that is mirror image of the first coupler (140), two symmetric branches (between 110, 115 and 160 for example) connected to the first

Art Unit: 2883

(140) and second (130) adiabatic couplers that matches the width of the coupler widths and two identical arms (110, 115) having Mach-Zehnder Interferometer (MZI) active elements (120) connected to them (only one shown in the figure, but both may have the same structure to remain symmetrical, column 2 lines 56-59) for dynamically changing the an optical property of the arm creating a phase shift and connecting the symmetric branches (column 2 line 39 – column 3 line 66).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over Cohen as applied to claim 1-3, 6-7, 10, 13 and 23-25 above, and further in view of **Hwang et al ("Polymeric 2x2 Electrooptic Switch Consisting of Asymmetric Y Junction and Mach-Zehnder Interferometer", IEEE Photonics Tech. Letters, Vol. 9 No. 6, June 1997)** (Hwang).

Cohen teaches the switch described above.

Cohen does not teach expressly the optical property that is changed includes an index of refraction of the arm.

Hwang teaches that MZI elements change the refractive index of the applied material causing a phase shift (section.II).

Cohen and Hwang are analogous art because they are from the same field of endeavor, 2x2 MZI optical switches.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the teaching of Hwang who states the a MZI switch causes of phase shift by changing a refractive index and correlate that two Cohen who teaches a MZI switch causing a phase shift, but not stating directly that it is from a refractive index change and conclude that the phase shift in Cohen is indeed caused by a refractive index change.

The motivation for doing so would have been to increase optical efficiency by reducing crosstalk (Hwang, Conclusion).

Allowable Subject Matter

7. **Claim 12** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: This claim would be allowable over the prior art of record if rewritten in independent form including all of the limitations of the base claim and any intervening claims because the latter, either alone or in combination, does not disclose nor render obvious an extinction ratio selected from a group consisting of an extinction ration of at least 30 in the C+L bands and an extinction ratio of at least 32 in the 1.3 μm wavelength window, in combination with the rest of the claimed limitations.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following all teach 2x2 asymmetric tapered couplers: Smith et al ("A Mode-Evolution-Type Integrated-Optical Beam Combiner for Coherent Receivers", IEEE Photonics Tech. Letters, Vol. 3 No. 4, April 1991), Berthold (US 4,262,992), Izutsu et al (US 4,674,827), (Kapon et al (US 4,846,540), Izutsu et al (US 4,850,666), Henry et al (US 4,998,793), Maerfeld et al (US 5,022,731), Diemeer (US 5,293,436), Granstrand (US 5,303,315), Van Der Tol (US 5,375,178), Van Der Tol (US 5,418,867), Lermينياux et al (US 5,521,993), Wolf et al (US 5,526,453), Van Der Tol (US 5,528,708), Murphy et al (US 5,594,818), Wolf et al (US 5,611,007), Khan et al (US 5,640,471), Khan et al (US 6,064,788), Little et al (US 6,078,605), Oaknin et al (US 6,856,751 B2), Mekis et al (US 6,915,047 B1).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Lepisto whose telephone number is (571) 272-1946. The examiner can normally be reached on M-F 7:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank Font can be reached on (571) 272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2883

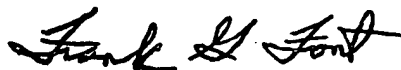
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Ryan Lepisto

Art Unit 2883

Date: 10/3/05



Frank Font

Supervisory Patent Examiner

Technology Center 2800